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(54) Title: **BEVERAGE COMPOSITIONS COMPRISING SWEETENER WITH EXTREMELY HIGH POTENCY**

(57) Abstract

Beverages comprising the sweetener N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester are disclosed. The beverages have been found to have a clean sweetener taste profile with an extremely low level of sweetener usage.

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TITLE

BEVERAGE COMPOSITIONS COMPRISING SWEETENER WITH
EXTREMELY HIGH POTENCY

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BACKGROUND OF THE INVENTION

Field of the Invention

- 10 This invention relates to the use of the sweetener, N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester (neotame), in beverage compositions, particularly those beverages having reduced calorie contribution from sugars.

Description of the Prior Art

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- Since the introduction of "diet" beverages in the 1950s and 1960s containing sweeteners such as saccharin and cyclamates as replacements for caloric sweeteners, the market for beverages containing sweeteners other than sugars has grown exponentially. This growth can be traced to the success of beverages
- 20 containing the sweetener, L-aspartyl-L-phenylalanine methyl ester ("aspartame"), a sweetener having a potency upward of 200 times that of sucrose or high fructose corn syrup. The success of aspartame can be traced to many factors,

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including the fact that aspartame is chemically the methyl ester of a dipeptide comprised of two naturally occurring amino acids.

Other sweeteners, and blends of sweeteners, have been suggested for use in beverages, for example acesulfame-K, sucralose, and alitame. However, while these sweeteners have significant potency as compared to sucrose or high fructose corn syrup, taste and other concerns have kept such sweeteners from being successfully and broadly used in beverages.

Attempts have been made to improve on the sweeteners used in beverages. These attempts have included blends of conventionally available sweeteners like aspartame with saccharin (see U.S. Patent No. 3,780,189) and aspartame with acesulfame-K (see U.S. Patent No. 4,158,068). These patents claimed that the resulting sweetener combinations have a more sucrose-like taste and/or potency synergy, the later of which could result in overall cost reduction.

The N-alkylated aspartame derivative, N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine methyl ester, is known as an extremely potent sweetening agent, as disclosed in U.S. Patent No. 5,480,668, the complete disclosure of which is incorporated by reference herein. Its sweetening potency, on a weight basis, is at least 40 times that of aspartame and about 8,000 times that of sucrose.

N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is a highly potent sweetener. It would be advantageous to be able to utilize its potency in beverage compositions. Such use is not described or suggested by the prior art.

SUMMARY OF THE INVENTION

This invention relates to a beverage composition comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten the beverage composition. It has been discovered that a wide variety of beverages can be produced using the sweetener, N-[N-(3,3-

dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester to provide some or all of the sweetness desired in such beverages. Such beverages have been found to have clean, sweet taste profiles, with the usage level being extremely low. The beverage compositions of this invention include, without limitation, fruit
5 and vegetable juices, carbonated soft drinks, powdered soft drink mixes, coffee and teas, dry mix coffee and teas, sweetened and flavored waters, sport/energy/health drinks, and hot-packed beverages.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

10 This invention is related to beverages sweetened by the addition of the sweetener, N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester. This sweetener has been found to have the desired combination of extremely high potency compared to sucrose while having a clean, sweet taste like that of sucrose in beverages. If this sweetener is replacing all of the
15 sweetness conventionally found in the beverage, the amount will range from about 2 to about 150 parts per million (ppm). More preferably, the amounts will range from about 10 to about 50 parts per million.

One of the benefits of the use of this sweetener in beverages is its potency, as it
20 is about 8,000 times that of sucrose or at least 40 times that of aspartame in most beverage uses. However, potency alone is not a sufficient measure of the benefits of a sweetener in a beverage. The predominant measure is a taste similar to the taste of sucrose in a variety of environments. The ability to produce a clean tasting sweetness in hot and cold beverages, beverages with
25 varying pH, as well as beverages with varying flavor types and acidity levels is necessary for a sweetener. It is also important that such sweetener can function in beverages packaged in wet (carbonated soft drink, bottled teas) and dry forms (powdered soft drinks).

30 The N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester sweetener described herein may be blended with one or more other sweeteners in such beverage uses. These sweeteners may be high intensity sweeteners or

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conventional caloric sweeteners. Such high intensity sweeteners may include, but are not limited to aspartame, acesulfame salts, e.g., acesulfame-K, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, glycyrrhizins, (e.g., mono-, di- and tri-ammoniated forms) or neohesperidin dihydrochalcone.

- 5 Such caloric sweeteners may include but are not limited to sucrose (in liquid or granular form), high fructose corn syrup, invert sugar, dextrose, glucose, crystalline fructose, high conversion corn syrup, and polyol sugar alcohols. Such additional sweeteners would reduce the level of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester required for such an application.

10

Any desired packaging can be used with the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine methyl ester. The extremely high potency of the sweetener results in great flexibility in packaging.

- 15 Any form of neotame may be used in the beverages of this invention. For example, salts and metal complexes of neotame may be used, such as disclosed in U.S. Patent Application No. 09/146,963, U.S. Patent Application No. 09/146,964, U.S. Patent Application No. 09/148,134, U.S. Patent Application No. 09/146,965, all filed September 4, 1998, and all of which are incorporated
20 by reference herein. Other exemplary forms of neotame that may be useful in this invention include cyclodextrin/neotame complexes such as disclosed in U.S. Provisional Patent Application No. 60/100,867 and cocrystallized neotame disclosed in U.S. Patent Application No. 09/154,568, both filed September 17, 1998, and the disclosure of both of which are incorporated by reference herein.

25

- Generally, the amount of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester employed will be dependent on the particular application. For specific beverage applications, the desired ranges of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester may vary due to
30 the pH, titratable acidity, acid type (e.g., citric, phosphoric, and the like), buffer systems, salt content, flavors, carbonation level, serving temperature, and ratio of all of the above components within the product. The objective in determining

the exact amount of usage for a particular beverage is guided by the flavor profile desired in view of beverages conventionally sweetened with sucrose, high fructose corn syrup, or high intensity sweeteners such as aspartame.

- 5 Typically, the amount of sweetener added to a beverage will be selected on the basis of the characteristics of the beverage to be sweetened. The form of the product also affects the sweetening level. For example, a powdered soft drink or other concentrates which require reconstitution are subject to variability in usage level by the consumer who buys a canister and measures for addition to
- 10 water. Therefore, there are many ways to select a targeted usage level. For example, a target of an 8 fluid oz. serving size could range from a one gram scoop, to a two gram scoop or even to a 10 to 12 gram scoop (commonly the size of a sugared beverage scoop) by selection of the bulking agent used with the sweetener.

15

Examples of the beverages which may be successfully sweetened using N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine methyl ester include, but are not limited to:

- carbonated soft drinks, including cola, lemon-lime, root beer, heavy citrus,
- 20 fruit flavored, cream sodas, and carbonated flavored waters
- powdered soft drinks, as well as liquid concentrates (including liquid, frozen, and shelf stable), fountain syrups, and cordials
- coffee and coffee-based drinks, coffee substitutes and cereal-based beverages
- 25 — teas, including dry mix products as well as ready-to-drink teas (herbal and tea-leaf based)
- fruit and vegetable juices and juice flavored beverages as well as juice drinks, juice cocktails, nectars, concentrates, punches and "ades"
- sweetened and flavored waters
- 30 — sport/energy/health drinks

- alcoholic beverages plus alcohol-free and other low-alcohol products including beer and malt beverages, cider, and wines (still, sparkling, fortified wines and wine coolers)
- other beverages processed with heating (infusions, pasteurization, ultra high
5 temperature, ohmic heating or commercial aseptic sterilization) and hot-filled packaging
- cold-filled products made through filtration, chemical preservation, and other preservation techniques

10 One preferred embodiment of the invention is directed to a carbonated soft drink comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten the drink. Another embodiment of the invention is directed to a carbonated soft drink comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a
15 natural or high intensity sweetener in a combined amount effective to sweeten the drink.

Yet another preferred embodiment of the invention is directed to a powdered or dry drink mix comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-
20 phenylalanine 1-methyl ester in an amount effective to sweeten a beverage prepared or reconstituted from the powdered or dry mix. As used herein, the term "reconstituted" includes the preparation of a beverage from the powdered or dry drink mixes of this invention. Another embodiment of this invention is directed to powdered or dry drink mixes comprising N-[N-(3,3-dimethylbutyl)-
25 L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten a beverage prepared from the powdered or dry drink mix.

Another preferred embodiment of this invention includes a juice beverage
30 comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten the juice beverage. The invention also includes juice beverages that are sweetened with a blend of N-[N-(3,3-

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dimethylbutyl)-L- α -aspartyl]-L-phenylalanine and a natural or high intensity sweetener.

- Still yet another preferred embodiment of this invention is directed to hot packed beverages comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten the beverage. This invention also includes hot packed beverages that comprise N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten the beverage. Other preferred embodiments of this invention include sports drinks, sweetened waters, flavored waters, sweetened carbonated waters and flavored carbonated waters.

- The invention can be more readily understood by referring to the Examples set forth below. The Examples which follow are intended as an illustration of certain preferred embodiments of the invention and no limitation of the invention is implied.

CARBONATED SOFT DRINKS

- Example 1: Cola Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

The constituents used to formulate the Cola of Example 1 are shown below in Table 1.

- Table 1
Example 1 Formulation
Cola, 17 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Batch Weight (Grams)	Formula % Finished Beverage
Carbonated Water	1992.45	99.6227
Sodium Benzoate	0.534	0.0267
Phosphoric Acid	0.75	0.0375
Citric Acid	0.178	0.0089

	Trisodium Citrate	0.266	0.0133
	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine methyl ester	0.034	0.0017
	Caffeine	0.10	0.0050
5	Cola Flavor Base	5.72	0.2859
	Total	2000 grams	100

A Cola Syrup was made by combining and mixing all of the ingredients, except water. The resulting syrup was combined (1 part of syrup with 5 parts of
 10 carbonated water) into glass bottles and capped. The bottle contents were gently mixed by inverting and swirling the container forming the Cola Carbonated Soft Drink of Example 1.

Various Cola compositions having different concentrations of N-[N-(3,3-
 15 dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine methyl ester can be used to sweeten Cola generally in an amount between about 5 ppm to about 100 ppm, more preferably between about 10 ppm to about 50 ppm, and most preferably between 15 ppm to about 35 ppm.

20

Examples 2-6: Cola Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Cola was prepared in a manner substantially similar to Example 1, with the exception that Examples 2-6 were sweetened with N-[N-(3,3-dimethylbutyl)-L-
 25 α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, or high fructose corn syrup.

Example 2: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl
 30 ester blended with APM.

Various Cola compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -

aspartyl]-L-phenylalanine methyl ester blended with APM is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 800 ppm APM. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 60 ppm to about 650 ppm APM. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 120 ppm to about 300 ppm APM.

- 10 Example 3: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Cola compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 900 ppm Ace-K. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 650 ppm Ace-K. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 120 ppm to about 300 ppm Ace-K.

- 25 Example 4: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Cola compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine

1-methyl ester and from about 10 ppm to about 1,200 ppm saccharin. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 800 ppm saccharin. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 250 ppm saccharin.

Example 5: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

10 Various Cola compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 4
15 ppm to about 100 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 40% (w/w) sucrose. The preferred range is from about 5 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 35% (w/w) sucrose. The most preferred range is from about 5 ppm to about 35
20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 4% (w/w) to about 25% sucrose.

Example 6: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with High Fructose Corn Syrup.

25 Various Cola compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and high fructose corn syrup were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with high
30 fructose corn syrup is from about 4 ppm to about 100 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 40% (w/w) high fructose corn syrup. The preferred range is

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from about 5 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 35% (w/w) high fructose corn syrup. The most preferred range is from about 5 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 4% (w/w) to about 25% high fructose corn syrup.

Example 7: Lemon-Lime Carbonated Soft Drink Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester.

The constituents used to formulate the Lemon-Lime Carbonated Soft Drink of Example 7 are shown below in Table 2.

Table 2
Example 7 Formulation

Lemon-Lime Carbonated Soft Drink, 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Batch Weight (Grams)	Formula % Finished Beverage
Carbonated Water	1992.562	99.6281
Potassium Benzoate	0.462	0.0231
Potassium Citrate	1.0	0.050
Citric Acid	3.842	0.1921
N-[N-3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0028	0.0014
Flavor	2.134	0.1067
Total	2000 grams	

A Lemon-Lime Syrup was made by combining and mixing all of the ingredients, except water. The resulting syrup was combined (1 part of syrup with 5 parts of carbonated water) into glass bottles and capped. The bottle contents were gently mixed by inverting and swirling the container forming the Lemon-Lime Carbonated Soft Drink of Example 7.

Various Lemon-Lime carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lemon-Lime carbonated soft drink generally in an amount between about 5 ppm to about 100 ppm, more preferably between about 10 ppm to about 50 ppm, and most preferably between 15 ppm to about 35 ppm.

Examples 8-10: Lemon-Lime Carbonated Soft Drink Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Lemon-Lime carbonated soft drink was prepared in a manner substantially similar to Example 7, with the exception that Examples 8-10 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), or saccharin.

Example 8: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM.

Various Lemon-Lime carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 800 ppm APM. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 650 ppm APM. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 120 ppm to about 300 ppm APM.

Example 9: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Lemon-Lime carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 900 ppm Ace-K. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 650 ppm Ace-K. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about from about 120 ppm to about 300 ppm Ace-K.

Example 10: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Lemon-Lime carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 10 ppm to about 1,200 ppm saccharin. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 800 ppm saccharin. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 250 ppm saccharin.

Example 11: Root Beer Carbonated Soft Drink Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester.

The constituents used to formulate the Root Beer Carbonated Soft Drink of Example 11 are shown below in Table 3.

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Table 3
Example 11 Formulation
Root Beer Carbonated Soft Drink, 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -
aspartyl]-L-phenylalanine 1-methyl ester

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	Ingredient	Batch Weight (Grams)	Formula % Finished Beverage
	Carbonated Water	1993.792	99.6896
15	Potassium Benzoate	0.468	0.0234
	Citric Acid	0.614	0.0307
	N-[N-(3,3-dimethylbutyl)-L- α - aspartyl]-L-phenylalanine 1-methyl ester	0.040	0.0020
20	Flavor	5.126	0.2563
	Total	2000 grams	100

A Root Beer Syrup was made by combining and mixing all of the ingredients, except water. The resulting syrup was combined (1 part of syrup with 5 parts of
25 carbonated water) into glass bottles and capped. The bottle contents were gently mixed by inverting and swirling the container forming the Root Beer Carbonated Soft Drink of Example 11.

Various Root Beer carbonated soft drink compositions having different
30 concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Root Beer carbonated soft drink generally in an amount between about 5 ppm to about 100 ppm, more preferably between about 10 ppm to about 50 ppm, and most preferably between
35 15 ppm to about 35 ppm.

Examples 12-14: Root Beer Carbonated Soft Drink Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Root Beer carbonated soft drink was prepared in a manner substantially similar to Example 11, with the exception that Examples 12-14 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), or saccharin.

10 Example 12: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM.

Various Root Beer carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 800 ppm APM. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 650 ppm APM. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 120 ppm to about 300 ppm APM.

25 Example 13: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Root Beer carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 4 ppm to about 80 ppm N-[N-(3,3-

dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 20 ppm to about 900 ppm Ace-K. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 650 ppm Ace-K. The most preferred
5 range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 120 to about 300 ppm Ace-K.

Example 14: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl
10 ester blended with Saccharin.

Various Root Beer carbonated soft drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for
15 adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 4 ppm to about 80 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 10 ppm to about 1,200 ppm saccharin. The preferred range is from about 4 ppm to about 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl
20 ester and from about 50 ppm to about 800 ppm saccharin. The most preferred range is from about 6 ppm to about 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 250 ppm saccharin.

25 Example 15: Flavored Carbonated Water Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester.

The constituents used to formulate the Flavored Carbonated Water of Example 15 are shown below in Table 4.

Table 4
Example 15 Formulation
Flavored Carbonated Water, 10 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

	Ingredient	Batch Weight (Grams)	Formula % Finished Beverage
	Carbonated Water	1993.792	99.6896
10	Potassium Benzoate	0.468	0.0234
	Citric Acid	0.614	0.0307
	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.040	0.0020
15	Flavor	5.126	0.2563
	Total	2000 grams	100

The Flavored Carbonated Water of Example 15 was made by combining the
20 ingredients and adding the resulting Flavored Carbonated Water to glass bottles.
The bottle contents were mixed by gently inverting and swirling the container.

Various Flavored Carbonated Water compositions having different
concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-
25 methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-
phenylalanine 1-methyl ester can be used to sweeten Flavored Carbonated Water
generally in an amount between about 5 ppm to about 50 ppm, more preferably
between about 5 ppm to about 30 ppm, and most preferably between 5 ppm to
about 15 ppm.

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POWDERED OR DRY MIX DRINKS

Example 16: Lemonade Powdered Soft Drink Concentrate Sweetened with N-
[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester.

The constituents used to formulate the Lemonade Powdered Soft Drink Mix of
35 Example 16 are shown below in Table 5.

Table 5
Example 16 Formulation
Lemonade Powdered Soft Drink Mix, 16 ppm N-[N-(3,3-dimethylbutyl)-L- α -
aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Formula % Finished Beverage
Water, Filtered	QS to 100
Citric Acid	0.43
Lemon Flavor	0.063
Beatreme 3579 Cloud, Kerry Ingredients	0.005
Tricalcium Phosphate	0.036
Yellow #5	0.0001
Sodium Citrate	0.011
Vitamin C	0.0028
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0016
Total	100

The Lemonade Powdered Soft Drink Mix of Example 16 was made by adding the citric acid to a jar with a screw top lid. The N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester then was added to the jar. The lid was screwed on tightly and the jar was shaken to dry blend the two ingredients. The remaining dry ingredients were added to the jar and the jar was shaken until the ingredients were mixed thoroughly. The resulting powder was packaged and stored in foil laminate pouches.

The lemonade can be reconstituted by mixing the approximately 6 grams of mix with 960 grams of water. The resulting mixture was stirred thoroughly until all dry mix was completely dissolved and refrigerated.

Various Lemonade Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lemonade Powdered Soft Drink Mix generally in an amount between about 8 ppm to about 20 ppm, more

preferably between about 9 ppm to about 18 ppm, and most preferably between 13 ppm to about 18 ppm in the reconstituted drink. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lemonade Powdered Soft Drink Mix generally in an amount between about 1,455 ppm to
5 about 3,636 ppm, more preferably between about 1,636 ppm to about 3,273 ppm, and most preferably between 2,363 ppm to about 3,272 ppm in the non-reconstituted drink mix.

Examples 17-22: Lemonade Powdered Soft Drink Mix Sweetened with N-[N-
10 (3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Lemonade Powdered Soft Drink Mix was prepared in a manner substantially similar to Example 16, with the exception that Examples 17-22 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester
15 blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, cyclamate, or neohesperidin dihydrochalcone (NHDC).

Example 17: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl
20 ester blended with APM.

Various Lemonade Powdered Soft Drink mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for
25 adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 800 ppm APM in the reconstituted drink. The preferred range is from about 1 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-
30 phenylalanine 1-methyl ester and from about 70 ppm to about 700 ppm APM in the reconstituted drink. The most preferred range is from about 8 ppm to about

14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 320 ppm APM in the reconstituted drink.

Example 18: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Lemonade Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 10 ppm to about 480 ppm Ace-K in the reconstituted drink. The preferred range is from about 1.75 ppm to about 17.5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 25 ppm to about 360 ppm Ace-K in the reconstituted drink. The most preferred range is from about 8 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 40 ppm to about 280 ppm Ace-K in the reconstituted drink.

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Example 19: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Lemonade Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 0.8 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 15.5 ppm to about 400 ppm saccharin in the reconstituted drink. The preferred range is from about 1 ppm to about 16 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 10 ppm to about 270

ppm saccharin in the reconstituted drink. The most preferred range is from about 6 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 20 ppm to about 175 ppm saccharin in the reconstituted drink.

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Example 20: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

Various Lemonade Powdered Soft Drink mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.25% (w/w) to about 16% (w/w) sucrose in the reconstituted drink. The preferred range is from about 0.5 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1.5% (w/w) to about 14% (w/w) sucrose in the reconstituted drink. The most preferred range is from about 1 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 3% (w/w) to about 12% (w/w) sucrose in the reconstituted drink.

Example 21: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Cyclamate.

Various Lemonade Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and cyclamate were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with cyclamate is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 80 ppm to about 5,300 ppm cyclamate in the reconstituted drink. The preferred

range is from about 4 ppm to about 17 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 4,300 ppm cyclamate in the reconstituted drink. The most preferred range is from about 10 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 200 ppm to about 1,000 ppm cyclamate in the reconstituted drink.

Example 22: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC.

- 10 Various Lemonade Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester
- 15 blended with NHDC is from about 7 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.5 ppm to about 4 ppm NHDC in the reconstituted drink. The preferred range is from about 8 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.6 ppm to about 3 ppm NHDC in
- 20 the reconstituted drink. The most preferred range is from about 12 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1 ppm to about 2 ppm NHDC in the reconstituted drink.

Example 23: Red Punch Powdered Soft Drink Mix.

- 25 The constituents used to formulate the Red Punch Powdered Soft Drink Mix of Example 23 are shown below in Table 6.

Table 6
Example 23 Formulation
Red Punch Powdered Soft Drink Mix, 14.5 ppm N-[N-(3,3-dimethylbutyl)-L- α -
aspartyl]-L-phenylalanine 1-methyl ester

5		
	Ingredient	Formula % Finished Beverage
	Water, Filtered	QS to 100
	Citric Acid	0.195
10	Maltodextrin 10DE	0.135
	Berry Flavor	0.064
	Punch Flavor	0.040
	Tricalcium Phosphate	0.030
	Red #40	0.013
15	Sodium Citrate	0.000
	Vitamin C	0.003
	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L- phenylalanine 1-methyl ester	0.00145
20	Total	100

The Red Punch Powdered Soft Drink Mix of Example 23 was made by adding the citric acid to a jar with a screw top lid. The N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester then was added to the jar. The lid was screwed on tightly and the jar was shaken to dry blend the two ingredients. The remaining dry ingredients were added to the jar and the jar was shaken until the ingredients were mixed thoroughly. The resulting powder was packaged and stored in foil laminate pouches.

The Red Punch can be reconstituted by mixing approximately 5 grams of mix with 960 grams of water. The resulting mixture was stirred thoroughly until all dry mix was completely dissolved and refrigerated.

Various Red Punch Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Red Punch Powdered Soft Drink Mix generally in an amount between about 7 ppm to about 20 ppm, more

preferably between about 8 ppm to about 18 ppm, and most preferably between 12 ppm to about 15 ppm in the reconstituted drink. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Red Punch Powdered Soft Drink Mix generally in an amount between about 1,400 ppm to
5 about 4,000 ppm, more preferably between about 1,600 ppm to about 3,600 ppm, and most preferably between 2,400 ppm to about 3,000 ppm in the non-reconstituted drink mix.

- 10 Examples 24-29: Red Punch Powdered Soft Drink Mix Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Red Punch Powdered Soft Drink Mix was prepared in a manner substantially similar to Example 23, with the exception that Examples 24-29 were sweetened
15 with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, cyclamate, or neohesperidin dihydrochalcone (NHDC).

- 20 Example 24: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM.

Various Red Punch Powdered Soft Drink mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was
25 combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 800 ppm APM in the reconstituted drink. The preferred range is
30 from about 1 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 70 ppm to about 600 ppm APM in the reconstituted drink. The most preferred range is from about 3 ppm to about

13 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 150 ppm to about 500 ppm APM in the reconstituted drink.

Example 25: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Red Punch Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 0.2 ppm to about 17 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 30 ppm to about 480 ppm Ace-K in the reconstituted drink. The preferred range is from about 4 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 360 ppm Ace-K in the reconstituted drink. The most preferred range is from about 8 ppm to about 12 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 70 ppm to about 150 ppm Ace-K in the reconstituted drink.

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Example 26: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Red Punch Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 0.2 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 6 ppm to about 400 ppm saccharin in the reconstituted drink. The preferred range is from about 7.5 ppm to about 16 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 12.5 ppm to about 250 ppm

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saccharin in the reconstituted drink. The most preferred range is from about 9 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 20 ppm to about 200 ppm saccharin in the reconstituted drink.

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Example 27: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

Various Red Punch Powdered Soft Drink mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 0.2 ppm to about 17 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.25% (w/w) to about 14% (w/w) sucrose in the reconstituted drink. The preferred range is from about 1 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1.5% (w/w) to about 11% (w/w) sucrose in the reconstituted drink. The most preferred range is from about 3 ppm to about 11 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 3% (w/w) to about 9% (w/w) sucrose in the reconstituted drink.

Example 28: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Cyclamate.

Various Red Punch Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and cyclamate were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with cyclamate is from about 0.2 ppm to about 17 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 60 ppm to about 4,500 ppm cyclamate in the reconstituted drink. The preferred

- 27 -

range is from about 4 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 80 ppm to about 3,400 ppm cyclamate in the reconstituted drink. The most preferred range is from about 10 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 2,000 ppm cyclamate in the reconstituted drink.

Example 29: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC.

- 10 Various Red Punch Powdered Soft Drink Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester
- 15 blended with NHDC is from about 7 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.5 ppm to about 4 ppm NHDC in the reconstituted drink. The preferred range is from about 8 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.6 ppm to about 3 ppm NHDC in
- 20 the reconstituted drink. The most preferred range is from about 12.5 ppm to about 16 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1 ppm to about 2.5 ppm NHDC in the reconstituted drink.

Example 30: Lemon Flavored Tea Dry Mix.

- 25 The constituents used to formulate the Lemon Flavored Tea Dry Mix of Example 30 are shown below in Table 7.

Table 7
Example 30 Formulation
Lemon Flavored Tea Dry Mix, 13 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

5		Ingredient	Formula % Finished Beverage
		Water, Filtered	QS to 100
		Citric Acid	0.14922
10		Maltodextrin 10DE	0.04974
		Instant Tea Kenya #102, Templar	0.14715
		Instant Tea Chile #103CH, Templar	0.14715
		Sodium Citrate	0.01658
		Lemon Flavor	0.00622
15		N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0013
		Total	100

20 The Lemon Flavored Tea Dry Mix of Example 30 was made by adding the citric acid to a jar with a screw top lid. The N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester then was added to the jar. The lid was screwed on tightly and the jar was shaken to dry blend the two ingredients. The remaining dry ingredients were added to the jar and the jar was shaken until the ingredients were mixed thoroughly.

25 The finished tea was prepared by adding 9 grams of the dry mix to 960 grams of water. The resulting mixture was stirred thoroughly until all dry mix was completely dissolved and refrigerated.

30 Various Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lemon Flavored Tea Dry Mix generally in an amount between about 7 ppm to about 20 ppm, more
35 preferably between about 8 ppm to about 17.5 ppm, and most preferably between 10 ppm to about 15 ppm in the reconstituted drink. N-[N-(3,3-

dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lemon Flavored Tea Dry Mix generally in an amount between about 1,400 ppm to about 4,000 ppm, more preferably between about 1,600 ppm to about 3,500 ppm, and most preferably between 2,000 ppm to about 3,000 ppm in the non-reconstituted dry mix.

Examples 31-35: Lemon Flavored Tea Dry Mix Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

10 Lemon Flavored Tea Dry Mix was prepared in a manner substantially similar to Example 28, with the exception that Examples 29-33 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, cyclamate, or neohesperidin dihydrochalcone (NHDC).

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Example 31: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM.

Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 0.6 ppm to about 19 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 40 ppm to about 760 ppm APM in the reconstituted drink. The preferred range is from about 1 ppm to about 14.5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 40 ppm to about 600 ppm APM in the reconstituted drink. The most preferred range is from about 1.4 ppm to about 13 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 500 ppm APM in the reconstituted drink.

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Example 32: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 0.6 ppm to about 19 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 25 ppm to about 480 ppm Ace-K in the reconstituted drink. The preferred range is from about 4 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 40 ppm to about 360 ppm Ace-K in the reconstituted drink. The most preferred range is from about 7.5 ppm to about 13 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 50 ppm to about 150 ppm Ace-K in the reconstituted drink.

Example 33: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 0.6 ppm to about 19 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 12 ppm to about 400 ppm saccharin in the reconstituted drink. The preferred range is from about 1 ppm to about 14.5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 20 ppm to about 300 ppm saccharin in the reconstituted drink. The most preferred range is from about 6 ppm to about 13 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine

1-methyl ester and from about 25 ppm to about 100 ppm saccharin in the reconstituted drink.

Example 34: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

Various Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 0.3 ppm to about 19 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.25% (w/w) to about 14% (w/w) sucrose in the reconstituted drink. The preferred range is from about 1 ppm to about 14 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1.5% (w/w) to about 11.5% (w/w) sucrose in the reconstituted drink. The most preferred range is from about 3 ppm to about 11 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 3% (w/w) to about 9% (w/w) sucrose in the reconstituted drink.

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Example 35: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC.

Various Lemon Flavored Tea Dry Mix compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC is from about 7 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.5 ppm to about 4 ppm NHDC in the reconstituted drink. The preferred range is from about 8 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 0.6 ppm to about 3 ppm NHDC in

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the reconstituted drink. The most preferred range is from about 10 ppm to about 15 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1 ppm to about 2.5 ppm NHDC in the reconstituted drink.

5 FRUIT JUICE BEVERAGES

Example 36: Cranberry Juice Cocktail (27% cranberry juice)

The constituents used to formulate the Cranberry Juice Cocktail (27% cranberry juice) of Example 36 are shown below in Table 8.

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Table 8

Example 36 Formulation

Cranberry Juice Cocktail (27% cranberry juice), 35 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

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Ingredient	Formula (%w/w)	Batch Weight (g)
Milne 50 Brix Cranberry Concentrate	4.20	42.0
Filtered Water	95.7965	957.965
20 N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0035	0.035
Total	100	1000

25 The Cranberry Juice Cocktail (27% juice) of Example 36 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the cranberry juice and water for approximately 2 minutes. The uniform juice cocktail was then refrigerated.

30 Various Cranberry Juice Cocktail (27% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Cranberry Juice Cocktail (27% juice) generally in an amount between about 20 ppm to about 150 ppm,

more preferably between about 25 ppm to about 120 ppm, and most preferably between 30 ppm to about 70 ppm.

Example 37: Cranberry Juice Cocktail (43% cranberry juice)

- 5 The constituents used to formulate the Cranberry Juice Cocktail (43% cranberry juice) of Example 37 are shown below in Table 9.

Table 9
Example 37 Formulation
10 Cranberry Juice Cocktail (43% cranberry juice), 40 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

	Ingredient	Formula (%w/w)	Batch Weight (g)
15	Milne 50 Brix Cranberry Concentrate	6.670	66.70
	Filtered Water	93.326	933.26
	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0040	0.040
20	Total	100	1000

The Cranberry Juice Cocktail (43% juice) of Example 37 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the cranberry juice and water for approximately 2 minutes. The uniform juice
25 cocktail was then refrigerated.

Various Cranberry Juice Cocktail (43% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-
30 phenylalanine 1-methyl ester can be used to sweeten Cranberry Juice Cocktail (43% juice) generally in an amount between about 20 ppm to about 150 ppm, more preferably between about 25 ppm to about 120 ppm, and most preferably between 30 ppm to about 70 ppm. The Cranberry Juice Cocktail (43% juice) sweetened with 40 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine

1-methyl ester provides a sugary, syrupy mouthfeel and taste with reduced harshness and bitterness compared to sucrose sweetened cranberry juice.

Example 38: Cranberry Juice Cocktail (55% cranberry juice)

- 5 The constituents used to formulate the Cranberry Juice Cocktail (55% cranberry juice) of Example 38 are shown below in Table 10.

Table 10
Example 38 Formulation
10 Cranberry Juice Cocktail (55% cranberry juice), 60 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

	Ingredient	Formula (%w/w)	Batch Weight (g)
15	Milne 50 Brix Cranberry Concentrate	8.438	84.38
	Filtered Water	91.556	915.56
	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0060	0.060
20	Total	100	1000

The Cranberry Juice Cocktail (55% juice) of Example 38 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the cranberry juice and water for approximately 2 minutes. The uniform juice
25 cocktail was then refrigerated.

Various Cranberry Juice Cocktail (55% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-
30 phenylalanine 1-methyl ester can be used to sweeten Cranberry Juice Cocktail (55% juice) generally in an amount between about 40 ppm to about 150 ppm, more preferably between about 45 ppm to about 120 ppm, and most preferably between 50 ppm to about 100 ppm.

Example 39: Cranberry Juice Beverage (100% cranberry juice)

The constituents used to formulate the Cranberry Juice Beverage (100% cranberry juice) of Example 39 are shown below in Table 11.

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Table 11
Example 39 Formulation
Cranberry Juice Beverage (100% cranberry juice), 70 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

10

Ingredient	Formula (%w/w)	Batch Weight (g)
Milne 50 Brix Cranberry Concentrate	15.45	154.5
Filtered Water	84.543	845.43
15 N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0070	0.070
Total	100	1000

20 The Cranberry Juice Beverage (100% juice) of Example 39 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the cranberry juice and water for approximately 2 minutes. The uniform juice beverage was then refrigerated.

25 Various Cranberry Juice Beverage (100% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Cranberry Juice Beverage (100% juice) generally in an amount between about 50 ppm to about 150 ppm,
30 more preferably between about 55 ppm to about 120 ppm, and most preferably between 60 ppm to about 100 ppm. The Cranberry Juice Beverage (100% juice) sweetened with 70 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester was very good because the acidity, astringency and bitterness of cranberry was significantly diminished and smoothed. This reduction in

bitterness was quite surprising and resulted in a Cranberry Juice Beverage (100% juice) that is significantly more palatable and more drinkable. Through the use of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester as a sweetener, a healthy and drinkable 100% Cranberry Juice Beverage can be produced.

Example 40: White Grapefruit Beverage

The constituents used to formulate the White Grapefruit Beverage of Example 40 are shown below in Table 12.

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Table 12
Example 40 Formulation
White Grapefruit Beverage, 50 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

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Ingredient	Formula (%w/w)	Batch Weight (g)
Jewel Brand 100% Unsweetened Grapefruit Juice from Concentrate	99.9950	1000
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0050	0.050
Total	100	1000.0050

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The White Grapefruit Beverage of Example 40 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the grapefruit juice for approximately 2 minutes. The uniform beverage was then refrigerated.

Various White Grapefruit Beverage compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten White Grapefruit Beverage generally in an amount between about 25 ppm to about 150 ppm, preferably between about 30 ppm to about 100 ppm, more preferably between 40 ppm to about 70 ppm, and most preferably between about 50 ppm and about 60 ppm. The White Grapefruit

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Beverage sweetened with about 50 ppm to about 60 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester provided a sugary, syrupy mouthfeel and fresh grapefruit flavor, with no harshness or bitterness. This reduction in bitterness provided a more palatable drink.

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Example 41: Lime Fruit Beverage

The constituents used to formulate the Lime Fruit Beverage of Example 41 are shown below in Table 13.

Table 13
Example 41 Formulation
Lime Fruit Beverage, 48 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Formula (%w/w)	Batch Weight (g)
Filtered Water	96.1492	40.0
Realime Brand Juice from Concentrate	3.8460	1000.0
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0048	0.050
Total	100	1040.05

The Lime Fruit Beverage of Example 41 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the lime juice and water for approximately 2 minutes. The uniform beverage was then refrigerated.

Various Lime Fruit Beverage compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Lime Fruit Beverage generally in an amount between about 25 ppm to about 150 ppm, preferably between about 30 ppm to about 100 ppm, more preferably between about 40 ppm to about 70 ppm, and most preferably between about 50 ppm and about 60 ppm. The Lime Fruit Beverage

sweetened with about 50 ppm to about 60 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester provided a sugary, syrupy mouthfeel and fresh lime flavor, with no harshness or bitterness. This reduction in bitterness provided a more palatable drink.

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Example 42: Hot Packed Peach Juice Drink (10% Juice).

The constituents used to formulate the Hot Packed Peach Juice Drink (10% Juice) of Example 42 are shown below in Table 14.

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Table 14
Example 42 Formulation
Hot Packed Peach Juice Drink (10% Juice), 25 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

15

Ingredient	Formula (%w/w)	Batch Weight (g)
Water, filtered	97.7270	488.635
FD&C #6	0.0004	0.002
Malic Acid	0.0175	0.0875
Citric Acid	0.050	0.25
20 N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0025	0.0125
SHMP	0.10	0.5
Potassium Citrate	0.0250	0.125
25 Kelcoloid HVF	0.0750	0.375
Orange Juice Concentrate	0.9480	4.74
Peach Concentrate	0.7790	3.895
Peach Flavor	0.2240	1.12
Orange Juice Flavor	0.050	0.25
30 Total	100	500

The Hot Packed Peach Juice Drink (10% juice) of Example 42 was made by heating a hot water bath to approximately 93°C (200°F). A jacketed mixing

vessel was filled with water and the hot water was passed through the jacket. A mixer was inserted into the water inside the vessel. The speed of the mixer was set to form a vortex. The colors, the acids, the sweeteners, the SHMP (sodium hexametaphosphate) and Potassium Citrate, the Kelcoloid HVF solution
5 (propylene glycol alginate), the concentrates, and the flavors were added, in that order, stirring before the addition of the next ingredient. The resulting mixture was mixed until it reached approximately 85°C (185°F). The heated mixture was packaged into two wide mouth bottles and the bottles were sealed as quickly as possible and inverted to insure proper seal.

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Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Hot Packed
15 Peach Juice Drink (10% juice) generally in an amount between about 10 ppm to about 40 ppm, more preferably between about 20 ppm to about 30 ppm, and most preferably between 25 ppm to about 27 ppm.

Examples 43-49: Hot Packed Peach Juice Drink (10% juice) Sweetened with N-
20 [N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Hot Packed Peach Juice Drink (10% juice) was prepared in a manner substantially similar to Example 42, with the exception that Examples 43-49 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-
25 methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, thaumatin, monoammonium glycyrrhizinate (MAG), or neohesperidin dihydrochalcone (NHDC).

Example 43: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl
30 ester blended with APM.

Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-

5 methyl ester and APM were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 3 ppm to about 30 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 400 ppm APM. The preferred range is from about 10 ppm to about 25 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 125 ppm to about 300 ppm APM. The most preferred range is from about 10 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 225 ppm to about 300 ppm APM.

Example 44: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

15 Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 5 ppm to about 30 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 90 ppm to about 470 ppm Ace-K. The preferred range is from about 8 ppm to about 25 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 310 ppm Ace-K. The most preferred range is from about 10 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 110 ppm to about 150 ppm Ace-K.

Example 45: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

30 Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-

phenylalanine 1-methyl ester and saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 5 ppm to about 30 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 70 ppm to about 200 ppm saccharin. The preferred range is from about 10 ppm to about 25 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 100 ppm to about 150 ppm saccharin. The most preferred range is from about 15 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 110 ppm to about 135 ppm saccharin.

Example 46: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 6 ppm to about 25 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2.5% (w/w) to about 6% (w/w) sucrose. The preferred range is from about 10 ppm to about 20 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 4% (w/w) sucrose. The most preferred range is from about 15 ppm to about 18 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 3% (w/w) sucrose.

Example 47: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with thaumatin.

Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-

phenylalanine 1-methyl ester and thaumatin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and thaumatin is about 27 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm thaumatin.

Example 48: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with MAG.

Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and MAG were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and MAG is about 27 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm MAG.

Example 49: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC.

Various Hot Packed Peach Juice Drink (10% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC is about 27 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm NHDC.

Example 50: Hot Packed Peach Juice Drink (1% Juice).

The constituents used to formulate the Hot Packed Peach Juice Drink (1% Juice) of Example 50 are shown below in Table 15.

Table 15
Example 50 Formulation

Hot Packed Peach Juice Drink (1% Juice), 23 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

	Ingredient	Formula (%w/w)	Batch Weight (g)
5	Water, filtered	99.2854	496.427
	FD&C #6	0.0004	0.002
	Malic Acid	0.0175	0.0875
	Citric Acid	0.050	0.25
10	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0023	0.0115
	SHMP	0.10	0.5
	Potassium Citrate	0.0250	0.125
	Kelcoloid HVF	0.0750	0.375
15	Orange Juice Concentrate	0.9480	4.74
	Peach Concentrate	0.0779	0.3895
	Peach Flavor	0.2240	1.12
	Orange Juice Flavor	0.050	0.25
	Total	100	500

20

The Hot Packed Peach Juice Drink (1% juice) of Example 50 was made by heating a hot water bath to approximately 93°C (200°F). A jacketed mixing vessel was filled with water and the hot water was passed through the jacket. A mixer was inserted into the water inside the vessel. The speed of the mixer was set to form a vortex. The colors, the acids, the sweeteners, the SHMP (sodium hexametaphosphate) and Potassium Citrate, the Kelcoloid HVF solution (propylene glycol alginate), the concentrates, and the flavors were added, in that order stirring before the addition of the next ingredient. The resulting mixture was mixed until it reached approximately 85°C (185°F). The heated mixture was packaged into two wide mouth bottles and the bottles were sealed as quickly as possible and inverted to insure proper seal.

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Various Hot Packed Peach Juice Drink (1% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Hot Packed Peach Juice Drink (1% juice) generally in an amount between about 10 ppm to about 35 ppm, more preferably between about 15 ppm to about 30 ppm, and most preferably between 20 ppm to about 25 ppm. Hot Packed Peach Juice Drink (1% juice) sweetened with 23 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester was judged to be well rounded with a good upfront sweet taste and the taste did not linger; the taste was not too sweet and the fruit flavor was acceptable.

Example 51: Orange Juice Drink (50% orange juice)

The constituents used to formulate the Orange Juice Drink (50% orange juice) of Example 51 are shown below in Table 16.

Table 16
Example 51 Formulation

Orange Juice Drink (50% orange juice), 5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Measure per Batch
Minute Maid Premium Orange Juice Concentrate, Pulp Free	178 milliliters
Filtered Water	1020 grams
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.006 grams

The Orange Juice Drink (50% juice) of Example 51 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the orange juice and water for approximately 10 minutes. The uniform juice drink was then refrigerated.

Various Orange Juice Drink (50% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Orange Juice Drink (50% juice) generally in an amount between about 1 ppm to about 8 ppm, more preferably between about 2 ppm to about 7 ppm, and most preferably between 3 ppm to about 6 ppm.

Example 52: Orange Juice Drink (65% orange juice)

The constituents used to formulate the Orange Juice Drink (65% orange juice) of Example 52 are shown below in Table 17.

Table 17

Example 52 Formulation

Orange Juice Drink (65% orange juice), 3 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Measure per Batch
Minute Maid Premium Orange Juice Concentrate, Pulp Free	240 milliliters
Filtered Water	1020 grams
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0038 grams

The Orange Juice Drink (65% juice) of Example 52 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the orange juice and water for approximately 10 minutes. The uniform juice drink was then refrigerated.

Various Orange Juice Drink (65% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Orange Juice Drink (65% juice) generally in an amount between about 0.5 ppm to about 6 ppm, more preferably between about 0.8 ppm to about 5 ppm, and most preferably between

1 ppm to about 4.5 ppm. Orange Juice Drink (65% juice) sweetened with about 3 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester was perceived as fresh squeezed.

5 Example 53: Orange Juice Drink (85% orange juice)

The constituents used to formulate the Orange Juice Drink (85% orange juice) of Example 53 are shown below in Table 18.

Table 18

Example 53 Formulation

- 10 Orange Juice Drink (85% orange juice), 2 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

Ingredient	Measure per Batch
Minute Maid Premium Orange Juice Concentrate, Pulp Free	302 milliliters
Filtered Water	1020 grams
N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0026 grams

- 20 The Orange Juice Drink (85% juice) of Example 53 was made by mixing the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester into the orange juice and water for approximately 10 minutes. The uniform juice drink was then refrigerated.

- 25 Various Orange Juice Drink (85% juice) compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Orange Juice Drink (85% juice) generally in an amount between about 0.5 ppm to about 4 ppm, more preferably between about 0.8 ppm to about 3.5 ppm, and most preferably
- 30 between 1 ppm to about 3 ppm. Orange Juice Drink (85% juice) sweetened with about 2 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester was perceived as fresh squeezed.

TEAS AND COFFEE**Example 54: Hot Packed Lemon Tea.**

The constituents used to formulate the Hot Packed Lemon Tea of Example 54
5 are shown below in Table 19.

Table 19
Example 54 Formulation
Hot Packed Lemon Tea, 12 ppm N-[N-(3,3-dimethylbutyl)-L- α -
10 aspartyl]-L-phenylalanine 1-methyl ester

	Ingredients	Formula (%w/w)
	Water, Filtered	99.541
	Malic Acid	0.125
15	N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester	0.0012
	Sodium Citrate	0.030
	Tea Powder	0.200
	Lemon Flavor	0.091
20	Tea Flavor	0.013
	Total	100

The Hot Packed Lemon Tea of Example 54 was made by heating a hot water bath to approximately 93°C (200°F). A jacketed mixing vessel was filled with
25 water and the hot water was passed through the jacket. A mixer was inserted into the water inside the vessel. The speed of the mixer was set to form a vortex. The malic acid, the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, and the sodium citrate were added in that order. The tea powder, the lemon flavor, and the tea flavor were added in that order,
30 mixing for approximately five minutes after adding each before adding the next ingredient. After the tea flavor was added, the resulting mixture was stirred until it reached approximately 85°C (185°F). The heated mixture was packaged

into two wide mouth bottles, and the bottles were sealed as quickly as possible and inverted to insure proper seal.

Various Hot Packed Lemon Tea compositions having different concentrations of
5 N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared. N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester can be used to sweeten Hot Packed Lemon Tea generally in an amount between about 8 ppm to about 14 ppm, preferably between about 10 ppm to about 12 ppm, and most preferably about 12 ppm.

10

Examples 55-61: Hot Packed Lemon Tea Sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with other sweeteners.

Hot Packed Lemon Tea was prepared in a manner substantially similar to
15 Example 54, with the exception that Examples 55-61 were sweetened with N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with another sweetener, i.e., either aspartame (APM), acesulfame-K (Ace-K), saccharin, sucrose, thaumatin, monoammonium glycyrrhizinate (MAG), or neohesperidin dihydrochalcone (NHDC).

20

Example 55: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM.

Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM were
25 prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with APM is from about 3 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 125 ppm to about 375 ppm APM. The preferred
30 range is from about 3 ppm to about 6 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 250 ppm to about 375 ppm APM. The most preferred blend is about 6 ppm N-[N-(3,3-dimethylbutyl)-

L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 250 ppm APM. This most preferred blend is approximately a 50/50 blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and APM.

- 5 Example 56: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K.

Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and Ace-K were prepared. A low level of one sweetener was combined with a high level
10 of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Ace-K is from about 3 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 150 ppm to about 470 ppm Ace-K. The preferred range is from about 6 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-
15 L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 150 ppm to about 310 ppm Ace-K. The most preferred blend is about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 150 ppm Ace-K. This most preferred blend is approximately 75% N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and 25% Ace-K.

20

Example 57: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Saccharin.

Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and
25 saccharin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with saccharin is from about 3 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 70 ppm to about 310
30 ppm saccharin. The preferred range is from about 6 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 170 ppm to about 310 ppm saccharin. The most preferred blend is about 9 ppm

N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 70 ppm saccharin. This most preferred blend is approximately 75% N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and 25% saccharin.

5

Example 58: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with Sucrose.

- Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and
- 10 sucrose were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose is from about 3 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1.85% (w/w) to about
- 15 5.6% (w/w) sucrose. The preferred range is from about 6 ppm to about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 1.85% (w/w) to about 3.7% (w/w) sucrose. The most preferred blend is about 9 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 1.85% (w/w) sucrose. This most preferred blend is
- 20 approximately 75% N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and 25% sucrose.

Example 59: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with thaumatin.

- 25 Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and thaumatin were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and thaumatin is
- 30 about 12 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm thaumatin.

Example 60: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with MAG.

Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and
5 MAG were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and MAG is about 12 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm MAG.

10

Example 61: N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with NHDC.

Various Hot Packed Lemon Tea compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and
15 NHDC were prepared. A low level of one sweetener was combined with a high level of the other sweetener. The preferred blend of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and NHDC is about 12 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 2 ppm NHDC.

20

Example 62: Brewed Coffee.

A brewed coffee beverage was prepared using Folgers brand (Aroma Roasted) coffee in an automatic drip coffee maker. The brewed coffee (240 mls) was poured into a cup and whitened with 2% milk. The coffee was sweetened by
25 adding 0.93 milligrams of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester to the coffee. The resulting coffee was acceptably sweet.

Example 63: Brewed Iced Tea.

30 A brewed tea beverage was prepared using Lipton Brisk brand tea bags. The brewed tea was chilled and 240 mls was poured into a cup. The iced tea was sweetened by adding 0.93 milligrams of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-

L-phenylalanine 1-methyl ester to the tea. The resulting tea was acceptably sweet.

SPORTS DRINK

5

Example 64: Reduced Calorie Sports Drink, 50% Carbohydrates Replaced.

The constituents used to formulate the Reduced Calorie Sports Drink with 50% of the carbohydrates replaced of Example 64 are shown below in Table 20.

10

Table 20
Example 64 Formulation
Reduced Calorie Sports Drink, 50% Carbohydrates Replaced,
3 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester

15	Ingredients	Formula (%w/w)	Batch Weight (g)
	Treated Water	96.027	480.135
	Sodium Benzoate	0.04	0.2
	Citric Acid	0.2	1
20	N-[N-(3,3-dimethylbutyl)-L- α - aspartyl]-L-phenylalanine 1-methyl ester	0.0003	0.0015
	Sucrose	1	5
	Dextrose	2.5	12.5
	Monopotassium Phosphate	0.018	0.09
25	Potassium Citrate	0.02	0.1
	Sodium Citrate	0.02	0.1
	Sodium Chloride	0.042	0.21
	Lemon Lime Flavor	0.1	0.5
	FD&C Yellow #5	0.033	0.165
30	Total	100	500

The Reduced Calorie Sports Drink with 50% of the carbohydrates replaced was made by adding the water to a beaker and stirring to form a vortex. The sodium benzoate, citric acid, sweeteners, and salts were added in that order, mixing for approximately 15 minutes until each were dissolved before adding the next
5 ingredient. Then the flavor was added to the solution, followed by the yellow color. The resulting solution was packaged into two wide mouth bottles.

Various Sports Drink compositions having different concentrations of N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester were prepared.
10 The N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester was blended with sucrose and dextrose to sweeten the sports drink, thereby reducing the sucrose/dextrose content of a typical sports drink by approximately 50%. A lower level of one sweetener was combined with a higher level of the other sweetener.

15 The general range for adding N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose/dextrose is from about 2 ppm to about 5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and about 1.50% (w/w) to about 5% (w/w) sucrose/dextrose. The
20 preferred range is from about 2.5 ppm to about 4 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 2% (w/w) to about 4% (w/w) sucrose/dextrose. The most preferred range is from about 3 ppm to about 3.5 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and from about 3.0% (w/w) to about 3.5% (w/w)
25 sucrose/dextrose. The combination of 3 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester and 1% (w/w) sucrose and 2.5% (w/w) dextrose was judged to be very acceptable. It had a well rounded flavor with good initial sweetness that did not linger; it was not too sweet and the salt flavor was acceptable.

WHAT IS CLAIMED IS:

1. A beverage comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten said beverage.
2. The beverage according to claim 1, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 2 to about 150 parts per million.
3. The beverage according claim 1, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl is in an amount of from about 10 to about 50 parts per million.
4. The beverage according to claim 1, further comprising a natural or high intensity sweetener selected from the group consisting of aspartame, acesulfame salts, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, monoammonium glycyrrhizins, neohesperidin dihydrochalcone, sucrose, high fructose corn syrup, invert sugar, dextrose, crystalline fructose, high conversion corn syrup, glucose, polyol sugar alcohols, and mixtures thereof.
5. The beverage of claim 1, wherein said beverage is selected from the group consisting of carbonated soft drinks, powdered soft drinks, liquid concentrates, coffee, coffee-based drinks, coffee substitutes, dry mix coffees, cereal-based beverages, ready-to-drink teas, herbal teas, tea-leaf based teas, dry mix teas, fruit juices, vegetable juices, juice flavored beverages, juice drinks, juice cocktails, nectars, punches, ades, juice concentrates, juice flavored concentrates, sweetened waters, flavored waters, carbonated waters, sports drinks, energy drinks and health drinks, alcoholic beverages, alcohol-free beer, low-alcohol beer, malt drinks, cider, wines, sparkling wines, and wine coolers.
6. The beverage of claim 1, wherein the beverage is selected from the group comprising beverages processed with heating and hot filled packaging.

7. The beverage of claim 1, wherein the beverage is selected from the group comprising cold-filled products.
8. A carbonated soft drink comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten said drink.
9. The carbonated soft drink according to claim 8, wherein said carbonated soft drink is selected from the group comprising colas, lemon-lime drinks, root beers, heavy citrus drinks, fruit flavored drinks, and cream soda.
10. The carbonated soft drink according to claim 8, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 5 ppm to about 100 ppm.
11. The carbonated soft drink according to claim 8, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 10 ppm to about 50 ppm.
12. The carbonated soft drink according to claim 8, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 15 ppm to 35 ppm.
13. The carbonated soft drink comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten said drink.
14. The carbonated soft drink according to claim 13, wherein said natural or high intensity sweetener is selected from the group consisting of aspartame, acesulfame salts, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, glycyrrhizins, neohesperidin dihydrochalcone, sucrose, high

fructose corn syrup, invert sugar, dextrose, crystalline fructose, high conversion corn syrup, glucose, polyol sugar alcohols, and mixtures thereof.

15. A powdered or dry drink mix comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten a beverage prepared from said powdered or dry drink mix.
16. The powdered or dry drink mix according to claim 15, wherein said drink mix is selected from the group consisting of lemonade powdered soft drink mix, red punch powdered soft drink mix, and lemon flavored tea dry mix.
17. The powdered or dry drink mix according to claim 15, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 7 ppm to about 20 ppm.
18. The powdered or dry drink mix according to claim 15, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 8 ppm to about 18 ppm.
19. The powdered or dry drink mix according to claim 15, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 10 ppm to about 18 ppm.
20. The powdered or dry drink mix comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten a beverage prepared from said powdered or dry drink mix.
21. The powdered or dry drink mix according to claim 20, wherein said natural or high intensity sweetener is selected from the group consisting of aspartame, acesulfame salts, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, glycyrrhizins, neohesperidin dihydrochalcone, sucrose, high

fructose corn syrup, invert sugar, dextrose, crystalline fructose, high conversion corn syrup, glucose, polyol sugar alcohols, and mixtures thereof.

22. A juice beverage comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten said juice beverage.

23. The juice beverage according to claim 22, wherein said juice beverage is selected from the group consisting of fruit juices, juice flavored beverages, juice drinks, juice cocktails, nectars, punches, ades, and juice and juice flavored concentrates.

24. The juice beverage according to claim 22, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 1 ppm to about 150 ppm.

25. The juice beverage according to claim 22, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 2 ppm to about 120 ppm.

26. The juice beverage according to claim 22, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 3 ppm to about 100 ppm.

27. The juice beverage according to claim 22, wherein said juice is a cranberry juice cocktail containing about 27% to about 100% cranberry juice and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 20 ppm to about 150 ppm.

28. The juice beverage according to claim 22, wherein said juice is a white grapefruit beverage and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-

phenylalanine 1-methyl ester is in an amount of from about 25 ppm to about 150 ppm.

29. The juice beverage according to claim 22, wherein said juice is a lime fruit beverage and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 25 ppm to about 150 ppm.

30. The juice beverage according to claim 22, wherein said juice beverage is an orange juice drink containing about 50% to about 85% orange juice and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 0.5 ppm to about 8 ppm.

31. A juice beverage comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten the juice beverage.

32. The juice beverage according to claim 31, wherein said natural or high intensity sweetener is selected from the group consisting of aspartame, acesulfame salts, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, glycyrrhizins, neohesperidin dihydrochalcone, sucrose, high fructose corn syrup, invert sugar, dextrose, crystalline fructose, high conversion corn syrup, glucose, polyol sugar alcohols, and mixtures thereof.

33. A hot packed beverage comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to sweeten said beverage.

34. The beverage according to claim 33, wherein said beverage is selected from the group consisting of hot packed fruit drinks and hot packed teas.

35. The beverage according to claim 33, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 8 ppm to about 40 ppm.

36. The beverage according to claim 33, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 10 ppm to about 30 ppm.

37. The beverage according to claim 33, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is in an amount of from about 12 ppm to about 27 ppm.

38. A hot packed beverage comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with a natural or high intensity sweetener in a combined amount effective to sweeten said beverage.

39. The beverage according to claim 38, wherein said natural or high intensity sweetener is selected from the group consisting of aspartame, acesulfame salts, sucralose, saccharin, alitame, cyclamates, stevia derivatives, thaumatin, glycyrrhizins, neohesperidin dihydrochalcone, sucrose, high fructose corn syrup, invert sugar, dextrose, crystalline fructose, high conversion corn syrup, glucose, polyol sugar alcohols, and mixtures thereof.

40. The beverage according to claim 33, wherein said beverage is a hot packed peach juice drink, containing about 1% to about 10% peach juice, and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 10 ppm to about 40 ppm.

41. The beverage according to claim 33, wherein said beverage is a hot packed lemon tea and wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 8 ppm to about 14 ppm.

42. A reduced calorie sports drink comprising N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester in an amount effective to provide 50% of the sweetening potency of the sports drink.

43. The reduced calorie sports drink according to claim 42, wherein said drink comprises N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester blended with sucrose and dextrose in a combined amount effective to sweeten said beverage.

44. The reduced calorie sports drink according to claim 42, wherein the N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 2 ppm to about 5 ppm and the sucrose and dextrose is present in a combined amount of about 1.50% to 5% by weight of the composition.

45. The reduced calorie sports drink according to claim 43, wherein said drink comprises about 3 ppm N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester, about 1% sucrose, and about 2.5% dextrose.

46. A beverage according to claim 5, wherein said beverage is selected from the group comprising sweetened waters, flavored waters, sweetened carbonated waters, and flavored carbonated waters.

47. A beverage according to claim 46, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 5 ppm to about 50 ppm.

48. A beverage according to claim 46, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 5 ppm to about 30 ppm.

49. A beverage according to claim 46, wherein said N-[N-(3,3-dimethylbutyl)-L- α -aspartyl]-L-phenylalanine 1-methyl ester is present in an amount of from about 5 ppm to about 15 ppm.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A23L1/236

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 480 668 A (NOFRE CLAUDE ET AL) 2 January 1996 see column 1, line 10 - line 11 see column 4, line 66 - line 67 see column 6, line 16 - line 26	1-49
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P, X	HOLLINGSWORTH P.: "New Sweeteners redefine Diet Beverage Market" FOOD TECHNOLOGY, vol. 52, no. 9, - September 1998 page 26 XP002101387 see right-hand column, last paragraph	1-49
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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

28 April 1999

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Bendl, E

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 98/26865

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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P, X	<p>WO 98 39979 A (ISHII SHOICHI ;AJINOMOTO KK (JP); SHIMIZU TETSUJI (JP)) 17 September 1998 & DATABASE WPI Section Ch, Derwent Publications Ltd., London, GB; Class B05, AN 98-506404 see abstract</p> <p>-----</p>	1-49

INTERNATIONAL SEARCH REPORT

Information on patent family members

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